

**Jet Propulsion Laboratory  
California Institute of Technology  
Pasadena, California**

**Commercial Off-The-Shelf (COTS)  
Series of Flash Memory Circuit Evaluations  
for Space Applications**

**Report No. 6**

**Burn-In Results  
for Intel Part No. DA28F016SV  
In Plastic Package**

**Electronic Parts Engineering Office 507  
January 20, 1997**

## **Introduction**

The commercial grade (0C to 70C) version of the 16 M Intel Flash Memory DA28F016SV has been evaluated and tested under accelerated conditions. The objective of this evaluation was to determine the reliability and robustness of a commercial grade part under military temperature test and burn-in conditions. The introduction of any failure mechanisms and or electrical degradation of AC or DC parameters were of concern.

## **Background Work**

A burn-in circuit was designed and mutually approved by JPL and DPA Labs Inc. to perform dynamic testing on the DA28F016SV Flash Memory. The circuit was designed for  $V_{cc} = 5.5V$ . This is a nonnominal voltage for this part and no voltage stress beyond the typical was intended. The burn-in board itself was built by DPA Labs Inc. They also conducted the burn-in. The burn-in temperature was set at +125C. This temperature was an acceleration since the part is rated at 70C max. This temperature was chosen for two reasons. One reason is to accelerate temperature induced mechanisms. Second was the fact that Intel performed their qualification of this part using 125C. Therefore it was agreed that this temperature should not cause any harm to the part. Current trips were set at the board to prevent damage and the voltage was monitored. A copy of the burn-in pin configuration is included in this report.

A test program was developed to test the Flash Memory using an Advantest ATE. The test program has provision to test and record DC and AC parametrics. Other provisions of the program include performing shmoo plots for  $V_{cc}$  operating. In addition the program does checkerboard and diagonal pattern write and erase cycles.

The test program conducts test at four configurations of biasing voltages per data sheet specification:

- $V_{cc}=5.0V$  and  $V_{pp}=5.0V$
- $V_{cc}=5.0V$  and  $V_{pp}=12.0V$
- $V_{cc}=3.3V$  and  $V_{pp}=5.0V$
- $V_{cc}=3.3V$  and  $V_{pp}=12.0V$

Pre and post burn-in readings were done using the aforementioned program. The test temperature used for measuring delta's was +125C and +70C. The read points for the burn-in were 0, 168, and 336 hours. A test summary as well as the burn-in results are included as a part of this report and the burn-in data.

## Burn-In Results

Seven devices were tested at 0 hours and then put on burn-in. All measurements were done at +125C. It was immediately apparent that three parameters were failing at this temperature for each part. The three parameters that failed were Vcc 5V Standby (ICCS); Vcc 5V Deep Power Down (ICCD); and Vcc 3.3V Deep Power Down (ICCD). The readings for these tests was above the data sheet limit at 70C. Therefore these readings were waived for 125C and the burn-in continued. Note that all other tests passed the data sheet limits even at +125C.

After 168 hours of burn-in all parts were tested again and all reading remained nearly constant. There were moderate changes for some device parameters but all remained within data sheet limits. SN8062 experienced parameter failures but it was believed to be attributed to a test problem and not a true device problem. This part was put back on burn-in. SN8051 showed a significant increase in Vpp Erase Current and Vpp Write Current although the readings remained in spec. SN8064 showed a significant increase in Vpp Write Current (IPPW) but remained in spec.

After 336 hours of burn-in all parts were tested at +125 and +70C to insure compliance with data sheet limits. No significant changes were detected except one. SN8051 failed Vcc Deep Power Down (ICCD) data sheet limit. The reading was 10.8 uA vs a limit of 5 uA. This is considered a legitimate device failure and the only one.

In summary the only failure modes brought out by the dynamic burn-in were related to increase in leakage or read/write currents. There were no hard functional failures that could be attributed to infant mortality at use conditions.

Based on this burn-in evaluation the commercial Flash Memory is acceptable for space applications having moderate risks. Intel previously reported 2/249 rejects after burning in 4 lots at Vcc=6.5V and +125C. The rejects were attributed to ICCS and gate oxide breakdown. This failure mechanism is considered an infant mortality problem and was accelerated by the 6.5V burn-in. The 5.5V dynamic burn-in performed by JPL was also effective. It also generated one leakage reject within 336 hours which may possibly be related to gate oxide rupture although this has not been confirmed. It is recommended that missions requiring low risk should burn-in these parts using an accelerated burn-in voltage for a duration of no less than 336 hours.

### Notes:

- 1) No failure analysis was done on the part in question or any other part that exhibited high leakage failure modes.
- 2) All testing was done by the Jet Propulsion Laboratory
- 3) Burn-in was performed by DPA Labs Inc.

1/20/97

M.Sandor

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**JET PROPULSION LABORATORY**  
**Electronic Parts Engineering Office**

DA28F016SV Flash Memory Dynamic Burn-In Circuit for 56-Lead SSOP

Pin	Name	Bias	Pin	Name	Bias	Pin	Name	Bias	Pin	Name	Bias
1	CE0#	GND	15	GND	GND	29	GND	GND	43	A8	f8
2	A12	f12	16	DQ6	R1	30	DQ11	R1	44	GND	GND
3	A13	f13	17	DQ14	R1	31	DQ3	R1	45	A7	f7
4	A14	f14	18	DQ7	R1	32	DQ10	R1	46	A6	f6
5	A15	f15	19	DQ15	R1	33	DQ2	R1	47	A5	f5
6	3/5#	GND	20	RY/BY#	R2	34	NC		48	A4	f4
7	CE1#	GND	21	OE#	GND	35	NC		49	A3	f3
8	NC		22	WE#	Vih	36	BYTE#	Vih	50	A2	f2
9	A20	f20	23	WP#	GND	37	A0	GND	51	A1	f1
10	A19	f19	24	DQ13	R1	38	DQ0	R1	52	A9	f9
11	A18	f18	25	DQ5	R1	39	DQ8	R1	53	A10	f10
12	A17	f17	26	DQ12	R1	40	DQ1	R1	54	A11	f11
13	A16	f16	27	DQ4	R1	41	DQ9	R1	55	R/P#	Vih
14	VCC	+5V	28	VCC	+5V	42	VCC	+5V	56	VPP	+5V

**Notes:**

Vcc = 5.5 +- 0.25 Vdc ( Current trip to be set to Board Level current-TBD), Voltage to be monitored during BI

Vih = 10 Kohm +- 10% resistor to Vcc (1/4 W)

R1 = 5 Kohm +- 10% resistor to Gnd (1/4 W)

R2 = 5 Kohm +- 10% resistor to Vcc (1/4 W)

f1 = 1.0 Mhz square wave, Vih = Vcc +- 0.2V, Vil = Gnd +- 0.2V, D.C. = 50 +- 5%

f2(freq) = 1/2 f1, f3(freq) = 1/2 f2, f4(freq) = 1/2 f3, ..... , f20(freq) = 1/2 f19.

**Outputs are loaded (Read mode)**

Approved:

Yes

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Jeff Church (DPA Labs)

Yes

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Mike Sandor (JPL)

## SN8051 BI Results

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**0-336 hr Burn-In Test Results for Intel DA28F016SV Flash Memory in Plastic Package** →

**SN: 8051 FAILS @ 70C**

Test No.	Description	# Tests	Lower Limit @70C	Upper Limit @70C	Pins Tested	Test Conditions
1	Diode Clamp + (VIP)	17	100.00 mV	1.000 V	1,2,3,4,5,6,7,8,9,10,11,12,13 Force +500 uA 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	
2	Diode Clamp - (VIN)	46	-1.000 V	-100.00 mV	1,2,3,4,5,6,7,8,9,10,11,12,13 Force -500 uA 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	
101	Input Leakage + (IIH)	38	-8.00 uA	8.000 uA	2,3,4,5,9,10,11,12,13,16,17, Vdd=5.5 V 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	
151	Input Leakage - (IIL)	38	-1.000 uA	1.000 uA	2,3,4,5,9,10,11,12,13,16,17, Vdd=3.6 V 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	
301	(Write CKB all 32 blocks) Read Checkerboard Memory				Vdd=3.3 V Vih=1.562 V Vil=1.006 V	pass pass pass pass
401	IOL Sink Current	16	5.80 mA		38,40,33,31,27,25,16,18,39, Vdd=4.75 V 41,32,30,26,24,17,19	14.86 ma 14.02 15.1 17.7 ma
451	IOL Sink Current	16	4.00 mA		38,40,33,31,27,25,16,18,39, Vdd=3.00 V 41,32,30,26,24,17,19	9.86 ma 9.46 9.9 11.7 ma
501	IOH Source Current	16	-2.00 mA		38,40,33,31,27,25,16,18,39, Vdd=3.00 V 41,32,30,26,24,17,19	-3.778 ma -3.73 -3.758 -4.22 ma
551	IOH Source Current	16	-2.50 mA		38,40,33,31,27,25,16,18,39, Vdd=4.75 V 41,32,30,26,24,17,19	-7.02 ma -6.96 -6.98 -7.92 ma
1001	$t_{ELQV}$ CE# to output delay	16	120 ns		38,40,33,31,27,25,16,18, Vdd=3.3 V 39,41,32,30,26,24,17,19, CL=15 pf	96 ns 95.2 96 88.1 ns
1021	Shmoo of $t_{AVQV}$ vs Vcc					2.45 V min 2.45 V min 2.45 V min 2.45 V min

**Dynamic Burn-In Results**

Time=0hrs Temp=125C	Time=168hrs Temp=125C	Time=336hrs Temp=125C	Time=336hrs Temp=70C
516 mv	520 m v	508 mv	612 mv
-552 mv	-558 mv	-546 mv	-638 mv
60 na	80	220	0.00 na
-100 na	-40	20	-400 pa
pass	pass	pass	pass
14.86 ma	14.02	15.1	17.7 ma
9.86 ma	9.46	9.9	11.7 ma
-3.778 ma	-3.73	-3.758	-4.22 ma
-7.02 ma	-6.96	-6.98	-7.92 ma
96 ns	95.2	96	88.1 ns
2.45 V min	2.45 V min	2.45 V min	2.45 V min

**SN8051 BI Results**

1021	$t_{AVQV}$ Address to output delay	16	120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19, CL=15 pf	Vdd=3.3 V	93.4 ns  18.7 ns	93.4  18.7	93.4  18.7	85.1 ns  16.9 ns
1041	$t_{GLQV}$ OE# to output delay	16	40 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19, CL=15 pf	Vdd=3.3 V	99.2 ua  21.6 ua	107.4  21.6	96.2  21.6	65.0 ua  24.3 ua
1100	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=3.3 V	160 ua  21.6 ua	160  21.6	160  21.6	102 ua  24.4 ua
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=3.3 V	22 ua  74.2 na	22  76	22  70.4	2.0 ua  21.0 na
	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=5.0 Fail @ 125C Pass @ 70C	19 ua  75.8 na	19.8  77.6	19.6  71.8	10.8 ua  21.1 na
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=5.0 V	37.8 ma  72.8 ma	37.8  73.1	38  73.2	37.8 ma  70.5 ma
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=5.0 Fail @ 125C Pass @ 70C	37.7 s  12.1 ma	37.7  12.1	36.4  12.1	33.8 s  13.6 ma
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=5.0 V	13.9 s  6.6 ma	14.4  6.6	13.3  6.8	14.7 s  7.4 ma
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=3.3 Fail @ 125C Fail @ 70C	16.3 s  6.6 ma	16.3  7.3	16.3  7.5	15.9 s  8.1 ma
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=3.3 V	22.1 s  4.0 ua	22.5  13.4 ma	21.7  13.5	22.4 s  15.2 ma
1200	Vcc Read Current ( $I_{CCR^1}$ )		95 mA	Vcc	Vdd=5.5 V f=10MHz	25.9 s  644 ua	25.9  14.1 ma	25.9  14.2	25.9 s  15.9 ma
1250	Vcc Read Current ( $I_{CCR^1}$ )		50 mA	Vcc	Vdd=3.6 V f=8 MHz	25.9 s  644 ua	25.9  14.1 ma	25.9  14.2	25.9 s  15.9 ma
1400	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 20 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	22.1 s  4.0 ua	22.5  13.4 ma	21.7  13.5	22.4 s  15.2 ma
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 25 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	25.9 s  644 ua	25.9  14.1 ma	25.9  14.2	25.9 s  15.9 ma
	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 10 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	25.9 s  644 ua	25.9  14.1 ma	25.9  14.2	25.9 s  15.9 ma
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 15 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	25.9 s  644 ua	25.9  14.1 ma	25.9  14.2	25.9 s  15.9 ma
1450	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 20 mA	Vpp	5V/5V Vdd=5.0 Vpp=5.0 V	See Note	22.5  13.4 ma	21.7  13.5	22.4 s  15.2 ma
	Checkerboard Write Vpp Write Current (IPPW)		60 s 22 mA	Vpp	5V/5V Vdd=5.0	See Note	25.9 s  644 ua	25.9  14.1 ma	25.9 s  14.2

## SN8051 BI Results

				Vpp=5.0 V
Checkerboard Clear Vpp Erase Current (IPPE)	60 s 10 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s 60 ua
Checkerboard Write Vpp Write Current (IPPW)	60 s 12 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	25.9 s 2.0 ma
2000	Checkerboard Clear	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	21.5 s 22
	Diagonal Pattern Write	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	35.7 s 35.7
	Diagonal Pattern Clear	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	13.7 s 14.3
	Diagonal Pattern Write	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	16.3 s 16.3
	Inverse Diagonal Pattern Clear	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	22.0 s 22.4
	Inverse Diagonal Pattern Write	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	25.9 s 25.9
	Inverse Diagonal Pattern Clear	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s 8.7
	Inverse Diagonal Pattern Write	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	25.9 s 25.9

&lt;End of Test Program&gt;

## SN8062 BI Results

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0-336 hr Burn-In Test Results for Intel DA28F016SV Flash Memory in Plastic Package  
SN: 8062 PASS @ 70C

Test No.	Description	# Tests	Lower Limit @ 70C	Upper Limit @ 70C	Pins Tested	Test Conditions
1	Diode Clamp + (VIP)	17	100.00 mV	1.000 V	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	Force +500 uA
2	Diode Clamp - (VIN)	46	-1.000 V	-100.00 mV	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	Force -500 uA
101	Input Leakage + (IIH)	38	-8.00 uA	8.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=5.5 V
151	Input Leakage - (IIL)	38	-1.000 uA	1.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=3.6 V
301	(Write CKB all 32 blocks) Read Checkerboard Memory					Vdd=3.3 V Vih=1.562 V Vil=1.006 V
401	IOL Sink Current	16	5.80 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V
451	IOL Sink Current	16	4.00 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V
501	IOH Source Current	16		-2.00 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V
551	IOH Source Current	16		-2.50 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V
1001	$t_{ELQV}$ CE# to output delay	16		120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf

## Dynamic Burn-In Results

Time=0hrs Temp=125C	Time=168hrs Temp=125C	Time=336hrs Temp=125C	Time=336hrs Temp=70C
510 mv	Test Problem	496	614 mv
-556 mv	Test Problem	-536	-648 mv
200 na	Test Problem	220	20.0 na
-58.6 na	Test Problem	-66.2	-400 pa
pass	Test Problem	pass	pass
15 ma	Test Problem	14.9	18.2 ma
9.96 ma	Test Problem	9.8	12.1 ma
-3.864 ma	Test Problem	-3.742	-4.36 ma
-7.12 ma	Test Problem	-6.92	-8.16 ma
91.1 ns	Test Problem	95	83.2 ns

## SN8062 BI Results

1021	Shmoo of t <sub>AVQV</sub> vs Vcc					2.45 V min	Test Problem	2.45 V min	2.45 V min	
1021	t <sub>AVQV</sub> Address to output delay	16	120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf	88.9 ns	Test Problem	92.6	81.5 ns	
1041	t <sub>GLQV</sub> OE# to output delay	16	40 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf	18.4 ns	Test Problem	18.4	16.1 ns	
1100	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=3.3 V	87.6 ua	Test Problem	89.2	60.0 ua	
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=3.3 V	21.6 ua	Test Problem	21	24.5 ua	
	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=5.0	Fail @ 125C Pass @ 70C	140 ua	Test Problem	138	98.0 ua
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=5.0 V	21.6 ua	Test Problem	21	24.5 ua	
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=5.0	Fail @ 125C Pass @ 70C	26 ua	Test Problem	30	200 na
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=5.0 V	73.2 na	Test Problem	65.8	16.2 na	
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=3.3	Fail @ 125C Pass @ 70C	22.8 ua	Test Problem	25.6	800 na
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=3.3 V	74.6 na	Test Problem	67.4	16.4 na	
1200	Vcc Read Current (I <sub>CCR</sub> <sup>1</sup> )		95 mA	Vcc	Vdd=5.5 V f=10MHz	71.8 ma	Test Problem	72.4	69.0 ma	
1250	Vcc Read Current (I <sub>CCR</sub> <sup>1</sup> )		50 mA	Vcc	Vdd=3.6 V f=8 MHz	37.7 ma	Test Problem	37.4	37.5 ma	
1400	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 20 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	22 s 12.2 ma	Test Problem	20.8	21.3 s 11.8	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 25 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	37.7 s 12.3 ma	Test Problem	37.7	33.8 s 11.9	
	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 10 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	14.2 s 6.6 ma	Test Problem	13.1	14.3 s 6.5	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 15 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	16.1 s 6.6 ma	Test Problem	16.3	16.3 s 7.2	
1450	Inverse Checkerboard Clear		60 s		5V/5V	21.1 s	Test Problem	25	21.5 s	

## SN8064 BI Results

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Electronic Parts Engineering Office

0-336 hr Burn-In Test Results for Intel DA28F016SV Flash Memory in Plastic Package  
SN: 8064 PASS @ 70C

Test No.	Description	# Tests	Lower Limit @ 70C	Upper Limit @ 70C	Pins Tested	Test Conditions
1	Diode Clamp + (VIP)	17	100.00 mV	1.000 V	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	Force +500 uA
2	Diode Clamp - (VIN)	46	-1.000 V	-100.00 mV	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	Force -500 uA
101	Input Leakage + (IIH)	38	-8.00 uA	8.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=5.5 V
151	Input Leakage - (IIL)	38	-1.000 uA	1.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=3.6 V
301	(Write CKB all 32 blocks) Read Checkerboard Memory					Vdd=3.3 V Vih=1.562 V Vil=1.006 V
401	IOL Sink Current	16	5.80 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V
451	IOL Sink Current	16	4.00 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V
501	IOH Source Current	16		-2.00 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V
551	IOH Source Current	16		-2.50 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V
1001	t <sub>ELOV</sub> CE# to output delay	16		120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf

## Dynamic Burn-In Results

Time=0hrs Temp=125C	Time=168hrs Temp=125C	Time=336hrs Temp=125C	Time=336hrs Temp=70C
506 mv	512 mv	496 mv	618 mv
-548 mv	-552 mv	-536 mv	-646 mv
40 na	-40 ns	20.0 na	20.0 na
-200 pa	-2.2 ns	400 pa	-400 pa
pass	pass	pass	pass
14.68 ma	15.26 ma	14.9 ma	16.3 ma
9.78 ma	10.0 ma	9.80 ma	11.1 ma
-3.78 ma	-3.79 ma	-3.74 ma	-4.20 ma
-6.96 ma	-7.02 ma	-6.92 ma	-7.74 ma
94 ns	94 ns	95 ns	85.2 ns

## SN8064 BI Results

1021	Shmoo of $t_{AVQV}$ vs Vcc					2.45 V min	2.45 V min	2.45 V min	2.45 V min	
1021	$t_{AVQV}$ Address to output delay	16	120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf	91.9 ns	91.9 ns	92.6 ns	83.7 ns	
1041	$t_{GLQV}$ OE# to output delay	16	40 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf	18 ns	18 ns	18.4 ns	16.1 ns	
1100	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=3.3 V	78 ua	80.4 ua	89.2 ua	58.4 ua	
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=3.3 V	21.2 ua	21.1 ua	21.0 ua	24.0 ua	
	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=5.0	Fail @ 125C Pass @ 70C	126 ua	130 ua	138 ua	92.0 ua
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=5.0 V	21.2 ua	21.2 ua	21.0 ua	24.0 ua	
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=5.0	Fail @ 125C Pass @ 70C	20.0 ua	24.0 ua	30.0 ua	200 na
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=5.0 V	52.8 na	61.2 na	65.8 na	9.6 na	
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=3.3	Fail @ 125C Pass @ 70C	18.4 ua	20.6 ua	25.6 ua	1.0 na
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=3.3 V	54.2 na	62.6 na	67.4 na	9.6 na	
1200	Vcc Read Current ( $I_{CCR}^1$ )		95 mA	Vcc	Vdd=5.5 V f=10MHz	72.1 ma	72.1 ma	72.4 ma	71.6 ma	
1250	Vcc Read Current ( $I_{CCR}^1$ )		50 mA	Vcc	Vdd=3.6 V f=8 MHz	37.6 ma	37.6 ma	37.4 ma	37.4 ma	
1400	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 20 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	21 s 12.0 ma	21.2 s 11.9 ma	20.8 s 11.8 ma	21.6 s 13.4 ma	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 25 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	37.7 s 12.1 ma	37.7 s 12.0 ma	37.7 s 11.9 ma	33.8 s 13.5 ma	
	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 10 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	13.5 s 6.6 ma	13.6 s 6.4 ma	13.1 s 6.5 ma	14.8 s 7.3 ma	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 15 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	16.3 s 7.3 ma	16.3 s 6.4 ma	16.3 s 7.2 ma	16.3 s 8.0 ma	
1450	Inverse Checkerboard Clear		60 s		5V/5V	21.2 s	21.3 s	25.0 s	21.9 s	

## SN8064 BI Results

Vpp Erase Current (IPPE)	20 mA	Vpp	Vdd=5.0 V Vpp=5.0 V	4.0 ua	13.4 ma	13.3 ma	15.3 ma
Checkerboard Write Vpp Write Current (IPPW)	60 s 22 mA	Vpp	5V/5V Vdd=5.0 V Vpp=5.0 V	25.9 s 644.0 ua	25.9 s 14.0 ma	25.9 s 14.0 ma	25.9 s 15.9 ma
Checkerboard Clear Vpp Erase Current (IPPE)	60 s 10 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s 60.0 ua	8.7 s 60.0 ua	8.7 s 60.0 ua	8.7 s 60.0 ua
Checkerboard Write Vpp Write Current (IPPW)	60 s 12 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	25.9 s 2.0 ma	25.9 s 2.0 ma	25.9 s 2.0 ma	25.9 s 2.0 ma
2000	Checkerboard Clear	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	20.9 s	20.9 s	20.7	21.4 s
	Diagonal Pattern Write	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	35.7 s	35.7 s	35.7 s	31.8 s
	Diagonal Pattern Clear	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	13.4 s	13.5 s	13.1 s	14.6 s
	Diagonal Pattern Write	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	16.3 s	16.3 s	16.3 s	16.3 s
	Inverse Diagonal Pattern Clear	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	21.2 s	21.3 s	21.0 s	21.7 s
	Inverse Diagonal Pattern Write	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	25.9 s	25.9 s	25.9 s	25.9 s
	Inverse Diagonal Pattern Clear	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s	8.7 s	8.7 s	8.7 s
	Inverse Diagonal Pattern Write	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	25.9 s	25.9 s	25.9 s	25.9 s

&lt;End of Test Program&gt;

## SN8057 BI Results

1/20/97 M.Sandor

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**JET PROPULSION LABORATORY**  
**Electronic Parts Engineering Office**

**0-336 hr Burn-In Test Results for Intel DA28F016SV Flash Memory in Plastic Package** →  
**SN 8057 PASS @ 70C**

Test No.	Description	# Tests	Lower Limit @ 70C	Upper Limit @ 70C	Pins Tested	Test Conditions
1	Diode Clamp + (VIP)	17	100.00 mV	1.000 V	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	Force +500 uA
2	Diode Clamp - (VIN)	46	-1.000 V	-100.00 mV	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	Force -500 uA
101	Input Leakage + (IIH)	38	-8.00 uA	8.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=5.5 V
151	Input Leakage - (IIL)	38	-1.000 uA	1.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=3.6 V
301	(Write CKB all 32 blocks) Read Checkerboard Memory					Vdd=3.3 V Vih=1.562 V Vil=1.006 V
401	IOL Sink Current	16	5.80 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V
451	IOL Sink Current	16	4.00 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V
501	IOH Source Current	16		-2.00 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V
551	IOH Source Current	16		-2.50 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V
1001	$t_{ELOV}$ CE# to output delay	16		120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf

**Dynamic Burn-In Results**

Time=0hrs Temp=125C	Time=168hrs Temp=125C	Time=336hrs Temp=125C	Time=336hrs Temp=70C
510 mv	524 mv	514 mv	616 mv
-546 mv	-558 mv	552 mv	-644 mv
80 na	-60 na	40 na	20.0 na
2.0 na	2.2 na	-400 pa	-400 pa
pass	pass	pass	pass
14.98 ma	15.4 ma	14.4 ma	17.7 ma
9.82 ma	10.1 ma	9.64 ma	11.7 ma
-3.65 ma	-3.69 ma	-3.64 ma	-4.10 ma
-6.82 ma	-6.90 ma	-6.78 ma	-7.72 ma
96.2 ns	96.0 ns	96.0 ns	88.1 ns

## SN8057 BI Results

1021	Shmoo of t <sub>AVQV</sub> vs Vcc					2.45 V min	2.45 V min	2.45 V min	2.45 V min	
1021	t <sub>AVQV</sub> Address to output delay	16	120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf	94.1 ns	92.6 ns	91.9 ns	85.1 ns	
1041	t <sub>GLOV</sub> OE# to output delay	16	40 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf	19.5 ns	19.1 ns	19.1 ns	17.2 ns	
1100	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=3.3 V	83.6 ua	93.6 ua	71.4 ua	78.4 ua	
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=3.3 V	21.4 ua	21.6 ua	21.8 ua	24.4 ua	
	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=5.0	FAIL @ 125C PASS @ 70C	140 ua	136 ua	132 ua	104 ua
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=5.0 V	21.4 ua	21.6 ua	21.8 ua	24.4 ua	
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=5.0	FAIL @ 125C PASS @ 70C	26.0 ua	22.0 ua	20.0 ua	200 na
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=5.0 V	71.0 na	59.6 na	44.4 na	13.8 na	
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=3.3	FAIL @ 125C PASS @ 70C	26.0 ua	20.2 ua	21.2 ua	800 na
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=3.3 V	73.0 na	60.8 na	45.4 na	14.0 na	
1200	Vcc Read Current (I <sub>CCR</sub> <sup>1</sup> )		95 mA	Vcc	Vdd=5.5 V f=10MHz	72.8 ma	72.4 ma	72.4 ma	72.4 ma	
1250	Vcc Read Current (I <sub>CCR</sub> <sup>1</sup> )		50 mA	Vcc	Vdd=3.6 V f=8 MHz	37.7 ma	37.6 ma	37.6 ma	37.3 ma	
1400	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 20 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	21.1 s 12.0 ma	21.3 s 12.1 ma	20.5 s 12.3 ma	21.0 s 13.7 ma	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 25 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	37.7 s 12.1 ma	37.7 s 12.1 ma	37.4 s 12.3 ma	33.9 s 13.8 ma	
	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 10 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	13.3 s 6.6 ma	13.6 s 6.6 ma	12.8 s 6.7 ma	14.0 s 24.4 ua	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 15 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	16.3 s 7.3 ma	16.3 s 6.6 ma	16.1 s 6.7 ma	16.3 s 803.9 ua	
1450	Inverse Checkerboard Clear		60 s		5V/5V	21.6 s	21.8 s	21.0 s	21.6 s	

**SN8057 BI Results**

Vpp Erase Current (IPPE)	20 mA	Vpp	Vdd=5.0 V Vpp=5.0 V	13.6 ma	13.7 ma	13.9 ma	15.4 ma
Checkerboard Write Vpp Write Current (IPPW)	60 s 22 mA	Vpp	5V/5V Vdd=5.0 V Vpp=5.0 V	25.9 s 14.2 ma	25.9 s 14.3 ma	25.9 s 14.6 ma	25.9 s 16.0 ma
Checkerboard Clear Vpp Erase Current (IPPE)	60 s 10 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s 60.0 ua	8.7 s 60.0 ua	8.7 s 60.0 ua	8.7 s 60.0 ua
Checkerboard Write Vpp Write Current (IPPW)	60 s 12 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	25.0 s 2.0 ma	25.9 s 2.0 ma	25.9 s 2.0 ma	25.9 s 2.0 ma
2000	Checkerboard Clear	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	20.9 s	21.2 s	20.3 s	20.8 s
	Diagonal Pattern Write	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	35.7 s	35.7 s	35.7 s	32.0 s
	Diagonal Pattern Clear	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	13.2 s	13.5 s	12.7 s	13.8 s
	Diagonal Pattern Write	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	16.3 s	16.3 s	16.3 s	16.1 s
	Inverse Diagonal Pattern Clear	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	21.5 s	21.7 s	20.9 s	21.4 s
	Inverse Diagonal Pattern Write	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	25.9 s	25.9 s	25.9 s	25.9 s
	Inverse Diagonal Pattern Clear	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s	8.7 s	8.7 s	8.7 s
	Inverse Diagonal Pattern Write	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	25.9 s	25.9 s	25.9 s	25.9 s

<End of Test Program>

## SN8052 BI Results

1/20/97 M.Sandor

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**JET PROPULSION LABORATORY**  
**Electronic Parts Engineering Office**

**0-336 hr Burn-In Test Results for Intel DA28F016SV Flash Memory in Plastic Package**  
**SN 8052 PASS @ 70C**

Test No.	Description	# Tests	Lower Limit @ 70C	Upper Limit @ 70C	Pins Tested	Test Conditions
1	Diode Clamp + (VIP)	17	100.00 mV	1.000 V	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	
2	Diode Clamp - (VIN)	46	-1.000 V	-100.00 mV	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	
101	Input Leakage + (IIL)	38	-8.00 uA	8.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=5.5 V
151	Input Leakage - (IIL)	38	-1.000 uA	1.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=3.6 V
301	(Write CKB all 32 blocks) Read Checkerboard Memory					Vdd=3.3 V Vih=1.562 V Vil=1.006 V
401	IOL Sink Current	16	5.80 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V
451	IOL Sink Current	16	4.00 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V
501	IOH Source Current	16		-2.00 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V
551	IOH Source Current	16		-2.50 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V
1001	$t_{ELQV}$ CE# to output delay	16		120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf

**Dynamic Burn-In Results**

Time=0hrs Temp=125C	Time=168hrs Temp=125C	Time=336hrs Temp=125C	Time=336hrs Temp=70C
502 mv	530 mv	520 mv	616 mv
-544 mv	-564 mv	-560 mv	-644 mv
-100 na	-40.0 na	-20.0 nA	20.0 nA
-2.2 na	-2.0 na	-400 pa	-400 pa
pass	pass	pass	pass
14.8 ma	14.7 ma	15.7 ma	18.0 ma
9.80 ma	9.84 ma	10.3 ma	12.0 ma
-3.75 ma	-3.79 ma	-3.84 ma	-4.26 ma
-6.96 ma	-7.08 ma	-7.16 ma	-8.02 ma
93.0 ns	92.0 ns	91.1 ns	84.5 ns

## SN8052 BI Results

1021	Shmoo of $t_{AVQV}$ vs Vcc					2.45 V min	2.45 V min	2.45 V min	2.45 V min	
1021	$t_{AVQV}$ Address to output delay	16	120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf	91.1 ns	90.4 ns	90.4 ns	83.0 ns	
1041	$t_{GLOV}$ OE# to output delay	16	40 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf	18.7 ns	18.4 ns	18.0 ns	16.1 ns	
1100	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=3.3 V	83.6 ua	72.0 ua	71.2 ua	59.0 ua	
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=3.3 V	21.4 ua	21.8 ua	21.8 ua	24.3 ua	
	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=5.0	FAIL @ 125C PASS @ 70C	140 ua	132 ua	136 ua	104 ua
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=5.0 V	21.5 ua	21.8 ua	21.8 ua	24.3 ua	
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=5.0	FAIL @ 125C PASS @ 70C	26.0 ua	24.0 ua	22.0 ua	200 na
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=5.0 V	81.6 na	61.2 na	54.2 na	20.0 na	
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=3.3	FAIL @ 125C PASS @ 70C	28.0 ua	24.8 ua	21.6 ua	800 na
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=3.3 V	83.0 na	62.4 na	55.4 na	20.2 na	
1200	Vcc Read Current ( $I_{CCR}^1$ )		95 mA	Vcc	Vdd=5.5 V f=10MHz	72.1 ma	71.5 ma	71.7 ma	72.8 ma	
1250	Vcc Read Current ( $I_{CCR}^1$ )		50 mA	Vcc	Vdd=3.6 V f=8 MHz	37.6 ma	37.4 ma	37.5 ma	37.3 ma	
1400	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 20 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	21.8 s 12.1 ma	22.3 s 12.1 ma	21.7 s 12.1 ma	22.3 s 13.6 ma	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 25 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	37.7 s 12.2 ma	37.7 s 12.2 ma	37.7 s 12.2 ma	22.4 s 13.8 ma	
	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 10 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	13.7 s 6.8 ma	14.3 s 21.7 ua	13.6 s 6.8 ma	14.9 s 24.3 ua	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 15 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	16.3 s 7.4 ma	16.1 s 26.1 ua	16.3 s 7.5 ma	16.3 s 801.3 ua	
1450	Inverse Checkerboard Clear		60 s		5V/5V	22.1 s	22.5 s	21.9 s	22.5 s	

## SN8052 BI Results

Vpp Erase Current (IPPE)	20 mA	Vpp	Vdd=5.0 V Vpp=5.0 V	13.4 ma	13.5 ma	13.6 ma	15.2 ma
Checkerboard Write Vpp Write Current (IPPW)	60 s 22 mA	Vpp	5V/5V Vdd=5.0 V Vpp=5.0 V	25.9 s 14.1 ma	25.9 s 14.1 ma	25.9 s 14.3 ma	25.9 s 15.8 ma
Checkerboard Clear Vpp Erase Current (IPPE)	60 s 10 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s 60.0 ua	8.8 s 60.0 ua	8.7 s 60.0 ua	8.7 s 60.0 ua
Checkerboard Write Vpp Write Current (IPPW)	60 s 12 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	25.9 s 2.0 ma	25.9 s 2.0 ma	25.9 s 2.0 ma	25.9 s 2.0 ma
2000	Checkerboard Clear	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	21.7 s	22.2 s	21.6 s	22.1s
	Diagonal Pattern Write	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	35.7 s	35.7 s	35.5 s	31.8 s
	Diagonal Pattern Clear	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	13.5 s	14.1 s	13.5 s	14.7 s
	Diagonal Pattern Write	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	16.3 s	16.3 s	16.3 s	16.3 s
	Inverse Diagonal Pattern Clear	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	22.0 s	22.4 s	21.8 s	22.3 s
	Inverse Diagonal Pattern Write	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	25.9 s	25.9 s	25.9 s	25.9 s
	Inverse Diagonal Pattern Clear	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s	8.7 s	8.7 s	8.7 s
	Inverse Diagonal Pattern Write	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	25.9 s	25.9 s	25.9 s	25.9 s

&lt;End of Test Program&gt;

## SN8053 BI Results

1/20/97 M.Sandor

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**JET PROPULSION LABORATORY**  
**Electronic Parts Engineering Office**

0-336 hr Burn-In Test Results for Intel DA28F016SV Flash Memory in Plastic Package  
SN 8053 PASS @ 70C

Dynamic Burn-In Results

Test No.	Description	# Tests	Lower Limit @ 70C	Upper Limit @ 70C	Pins Tested	Test Conditions	Time=0hrs Temp=125C	Time=168hrs Temp=125C	Time=336hrs Temp=125C	Time=336hrs Temp=70C
							526 mv	520 mv	522 mv	616 mv
1	Diode Clamp + (VIP)	17	100.00 mV	1.000 V	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	Force +500 uA				
2	Diode Clamp - (VIN)	46	-1.000 V	-100.00 mV	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	Force -500 uA	-556 mv	-550 mv	-554 mv	-638 mv
101	Input Leakage + (IIH)	38	-8.00 uA	8.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=5.5 V	20.0 na	-40.0 na	40.0 na	20.0 ns
151	Input Leakage - (IIL)	38	-1.000 uA	1.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=3.6 V	-400 pa	-2.2 na	200 pa	-400 pa
301	(Write CKB all 32 blocks) Read Checkerboard Memory					Vdd=3.3 V Vih=1.562 V Vil=1.006 V	pass	pass	pass	pass
401	IOL Sink Current	16	5.80 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V	15.2 ma	12.9 ma	13.5 ma	17.7 ma
451	IOL Sink Current	16	4.00 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V	10.0 ma	8.88 ma	9.18 ma	11.7 ma
501	IOH Source Current	16		-2.00 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V	-3.81 ma	-3.66 ma	-3.73 ma	-4.22 ma
551	IOH Source Current	16		-2.50 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V	-7.10 ma	-6.90 ma	-6.94 ma	-7.96 ma
1001	t <sub>ELQV</sub> CE# to output delay	16		120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf	93.2 ns	94.0 ns	93.0 ns	85.5 ns

## SN8053 BI Results

1021	Shmoo of t <sub>AVQV</sub> vs Vcc					2.45 V min	2.45 V min	2.45 V min	2.45 V min	
1021	t <sub>AVQV</sub> Address to output delay	16	120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf	91.1 ns	91.1 ns	90.4 ns	83.7 ns	
1041	t <sub>GLOV</sub> OE# to output delay	16	40 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19,	Vdd=3.3 V CL=15 pf	18.7 ns	18.7 ns	18.4 ns	16.5 ns	
1100	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=3.3 V	75.4 ua	81.4 ua	75.0 ua	60.0 ua	
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=3.3 V	22.1 ua	22.0 ua	22.1 ua	24.7 ua	
	Vcc Standby (ICCS)		130 uA	Vcc	Vdd=5.0	FAIL @ 125C PASS @ 70C	130 ua	140 ua	132 ua	106 ua
	Vpp Read Current (IPPR) Vpp>Vcc		200 uA	Vpp	Vdd=5.0 V	22.1 ua	22.0 ua	22.1 ua	24.8 ua	
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=5.0	FAIL @ 125C PASS @ 70C	16.0 ua	20.0 ua	14.0 ua	200 na
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=5.0 V	56.6 na	70.4 na	55.2 na	18.4 na	
	Vcc Deep Power Down (ICCD)		5 uA	Vcc	Vdd=3.3	FAIL @ 125C PASS @ 70C	14.6 ua	16.4 ua	14.8 ua	1.0 ua
	Vpp Deep Power Down (IPPD)		5 uA	Vpp	Vdd=3.3 V	58.2na	71.8 na	56.4 na	18.2na	
1200	Vcc Read Current (I <sub>CCR</sub> <sup>1</sup> )		95 mA	Vcc	Vdd=5.5 V f=10MHz	72.6 ma	72.9 ma	72.9 ,ma	75.3 ma	
1250	Vcc Read Current (I <sub>CCR</sub> <sup>1</sup> )		50 mA	Vcc	Vdd=3.6 V f=8 MHz	37.6 ma	37.8 ma	37.8 ma	37.5 ma	
1400	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 20 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	21.6 s 12.3 ma	21.7 s 12.2 ma	21.1 s 12.4 ma	21.8 s 13.7 ma	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 25 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	37.7 s 12.5 ma	37.7 s 12.3 ma	37.7 s 12.4 ma	33.8 s 13.8 ma	
	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 10 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	13.9 s 22.1 ua	14.0 s 6.8 ma	13.3 s 6.9 ma	14.6 s 7.5 ma	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 15 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	16.3 s 728 ua	16.3 s 6.8 ma	16.3 s 6.9 ma	16.3 s 8.3 ma	
1450	Inverse Checkerboard Clear		60 s		5V/5V	22.1 s	22.2 s	21.6 s	22.2 s	

**SN8053 BI Results**

Vpp Erase Current (IPPE)	20 mA	Vpp	Vdd=5.0 V Vpp=5.0 V	13.7 ma	13.6 ma	4.1 ua	15.1 ma
Checkerboard Write Vpp Write Current (IPPW)	60 s 22 mA	Vpp	5V/5V Vdd=5.0 V Vpp=5.0 V	25.9 s 14.4 ma	25.9 s 14.2 ma	25.9 s 644.1 ua	25.9 s 16.1 ma
Checkerboard Clear Vpp Erase Current (IPPE)	60 s 10 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s 60.0 ua	8.7 s 60.0 ua	8.7 s 60.0 ua	8.7 s 60.0 ua
Checkerboard Write Vpp Write Current (IPPW)	60 s 12 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	25.9 s 2.0 ma	25.9 s 2.0 ma	25.9 s 2.0 ma	25.9 s 2.0 ma
2000	Checkerboard Clear	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	21.5 s	21.7 s	21.1 s	21.6 s
	Diagonal Pattern Write	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	35.7 s	35.7 s	35.7 s	31.8 s
	Diagonal Pattern Clear	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	13.8 s	13.9 s	13.2 s	14.4 s
	Diagonal Pattern Write	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	16.3 s	16.3 s	16.3 s	16.3 s
	Inverse Diagonal Pattern Clear	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	22.0 s	22.1 s	21.5 s	22.1 s
	Inverse Diagonal Pattern Write	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	25.9 s	25.9 s	25.9 s	25.9 s
	Inverse Diagonal Pattern Clear	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s	8.7 s	8.7 s	8.7 s
	Inverse Diagonal Pattern Write	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	25.9 s	25.9 s	25.9 s	25.9 s

<End of Test Program>

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**JET PROPULSION LABORATORY**  
**Electronic Parts Engineering Office**

0-336 hr Burn-In Test Results for Intel DA28F016SV Flash Memory in Plastic Package  
SN 8054 PASS @ 70C

Test No.	Description	# Tests	Lower Limit @ 70C	Upper Limit @ 70C	Pins Tested	Test Conditions
1	Diode Clamp + (VIP)	17	100.00 mV	1.000 V	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	Force +500 uA
2	Diode Clamp - (VIN)	46	-1.000 V	-100.00 mV	1,2,3,4,5,6,7,8,9,10,11,12,13, 16,17,18,19,21,22,23,24,25, 26,27,30,31,32,33,36,37,38, 39,40,41,43,45,46,47,48,49, 50,51,52,53,54,55,56	Force -500 uA
101	Input Leakage + (IIH)	38	-8.00 uA	8.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=5.5 V
151	Input Leakage - (IIL)	38	-1.000 uA	1.000 uA	2,3,4,5,9,10,11,12,13,16,17, 18,19,23,24,25,26,27,30,31, 32,33,37,38,39,40,41,43,45, 46,47,48,49,50,51,52,53,54	Vdd=3.6 V
301	(Write CKB all 32 blocks) Read Checkerboard Memory				Vdd=3.3 V Vih=1.562 V Vil=1.006 V	pass pass pass pass
401	IOL Sink Current	16	5.80 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V
451	IOL Sink Current	16	4.00 mA		38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V
501	IOH Source Current	16		-2.00 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=3.00 V
551	IOH Source Current	16		-2.50 mA	38,40,33,31,27,25,16,18,39, 41,32,30,26,24,17,19	Vdd=4.75 V
1001	t <sub>ELQV</sub>	16		120 ns	38,40,33,31,27,25,16,18,	Vdd=3.3 V

**Dynamic Burn-In Results**

Time=0hrs Temp=125C	Time=168hrs Temp=125C	Time=336hrs Temp=125C	Time=336hrs Temp=70C
510 mv	502 mv	498 mv	616 mv
-548 mv	-540 mv	542 mv	-640 mv
-100 na	20.0 na	20.0 na	20.0 na
-2.2 na	2.2 na	-400 pa	-400 pa
pass	pass	pass	pass
15.1 ma	15.0 ma	15.0 ma	17.7 ma
9.94 ma	9.88 ma	9.88 ma	11.8 ma
-3.76 ma	-3.73 ma	-3.76 ma	-4.20 ma
-6.98 ma	-6.94 ma	-6.98 ma	-7.88 ma
93.0 ns	93.0 ns	95.0 ns	85.2 ns

## SN8054 BI Results

	CE# to output delay		39,41,32,30,26,24,17,19,	CL=15 pf						
1021	Shmoo of $t_{AVQV}$ vs Vcc				2.45 V min	2.45 V min	2.45 V min	2.45 V min		
1021	$t_{AVQV}$	16	120 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19, CL=15 pf	Vdd=3.3 V	91.1 ns	91.1 ns	91.9 ns	83.7 ns	
1041	$t_{GLQV}$	16	40 ns	38,40,33,31,27,25,16,18, 39,41,32,30,26,24,17,19, CL=15 pf	Vdd=3.3 V	18.7 ns	18.7 ns	18.0 ns	16.5 ns	
1100	Vcc Standby (ICCS)		130 $\mu$ A	Vcc	Vdd=3.3 V	83.6 $\mu$ a	82.6 $\mu$ a	80.8 $\mu$ a	60.4 $\mu$ a	
	Vpp Read Current (IPPR) Vpp>Vcc		200 $\mu$ A	Vpp	Vdd=3.3 V	21.8 $\mu$ a	21.9 $\mu$ a	21.1 $\mu$ a	24.6 $\mu$ a	
	Vcc Standby (ICCS)		130 $\mu$ A	Vcc	Vdd=5.0	FAIL @ 125C PASS @ 70C	142 $\mu$ a	140 $\mu$ a	132 $\mu$ a	104 $\mu$ a
	Vpp Read Current (IPPR) Vpp>Vcc		200 $\mu$ A	Vpp	Vdd=5.0 V	21.8 $\mu$ a	21.9 $\mu$ a	21.1 $\mu$ a	24.7 $\mu$ a	
	Vcc Deep Power Down (ICCD)		5 $\mu$ A	Vcc	Vdd=5.0	FAIL @ 125C PASS @ 70C	24.0 $\mu$ a	22.0 $\mu$ a	24.0 $\mu$ a	200 na
	Vpp Deep Power Down (IPPD)		5 $\mu$ A	Vpp	Vdd=5.0 V	73.8 na	71.8 na	56.0 na	19.0 na	
	Vcc Deep Power Down (ICCD)		5 $\mu$ A	Vcc	Vdd=3.3	FAIL @ 125C PASS @ 70C	26.4 $\mu$ a	23.2 $\mu$ a	20.8 $\mu$ a	1.0 $\mu$ a
	Vpp Deep Power Down (IPPD)		5 $\mu$ A	Vpp	Vdd=3.3 V	75.2 na	73.4 na	57.2 na	19.2 na	
1200	Vcc Read Current ( $I_{CCR}^1$ )		95 mA	Vcc	Vdd=5.5 V f=10MHz	72.5 ma	72.6 ma	72.1 ma	73.7 ma	
1250	Vcc Read Current ( $I_{CCR}^1$ )		50 mA	Vcc	Vdd=3.6 V f=8 MHz	37.7 ma	37.5 ma	37.6 ma	37.4 ma	
1400	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 20 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	21.5 s 11.8 ma	21.8 s 11.8 ma	20.8 s 11.9 ma	21.2 s 13.3 ma	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 25 mA	Vpp	3V/5V Vdd=3.3 V Vpp=5.0 V	37.7 s 11.9 ma	37.7 s 12.0 ma	37.7 s 12.0 ma	33.8 s 13.5 ma	
	Inverse Checkerboard Clear Vpp Erase Current (IPPE)		60 s 10 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	12.9 s 6.6 ma	13.2 s 6.6 ma	13.3 s 21.1 ua	16.3 s 7.2 ma	
	Inverse Checkerboard Write Vpp Write Current (IPPW)		60 s 15 mA	Vpp	3V/12V Vdd=3.3 V Vpp=12.0 V	16.3 s 7.3 ma	16.1 s 6.6 ma	16.3 s 697.6 ua	16.1 s 8.0 ma	

## SN8054 BI Results

1450	Inverse Checkerboard Clear Vpp Erase Current (IPPE)	60 s 20 mA	Vpp	5V/5V Vdd=5.0 V Vpp=5.0 V	<table border="1"><tr><td>21.6 s</td><td>21.9 s</td><td>21.1 s</td><td>21.6 s</td></tr><tr><td>13.3 ma</td><td>13.4 ma</td><td>13.5 ma</td><td>15.0 ma</td></tr></table>	21.6 s	21.9 s	21.1 s	21.6 s	13.3 ma	13.4 ma	13.5 ma	15.0 ma
21.6 s	21.9 s	21.1 s	21.6 s										
13.3 ma	13.4 ma	13.5 ma	15.0 ma										
Checkerboard Write Vpp Write Current (IPPW)	60 s 22 mA	Vpp	5V/5V Vdd=5.0 V Vpp=5.0 V	<table border="1"><tr><td>25.9 s</td><td>29.5 s</td><td>25.9 s</td><td>25.9 s</td></tr><tr><td>13.9 ma</td><td>14.0 ma</td><td>14.1 ma</td><td>15.6 ma</td></tr></table>	25.9 s	29.5 s	25.9 s	25.9 s	13.9 ma	14.0 ma	14.1 ma	15.6 ma	
25.9 s	29.5 s	25.9 s	25.9 s										
13.9 ma	14.0 ma	14.1 ma	15.6 ma										
Checkerboard Clear Vpp Erase Current (IPPE)	60 s 10 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	<table border="1"><tr><td>8.7 s</td><td>8.7 s</td><td>8.7 s</td><td>8.7 s</td></tr><tr><td>60.0 ua</td><td>60.0 ua</td><td>60.0 ua</td><td>60.0 ua</td></tr></table>	8.7 s	8.7 s	8.7 s	8.7 s	60.0 ua	60.0 ua	60.0 ua	60.0 ua	
8.7 s	8.7 s	8.7 s	8.7 s										
60.0 ua	60.0 ua	60.0 ua	60.0 ua										
Checkerboard Write Vpp Write Current (IPPW)	60 s 12 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	<table border="1"><tr><td>25.9 s</td><td>25.9 s</td><td>25.9 s</td><td>25.9 s</td></tr><tr><td>2.0 ma</td><td>2.0 ma</td><td>2.0 ma</td><td>2.0 ma</td></tr></table>	25.9 s	25.9 s	25.9 s	25.9 s	2.0 ma	2.0 ma	2.0 ma	2.0 ma	
25.9 s	25.9 s	25.9 s	25.9 s										
2.0 ma	2.0 ma	2.0 ma	2.0 ma										
2000	Checkerboard Clear	60 s		3V/5V Vdd=3.3 V Vpp=5.0 V	<table border="1"><tr><td>21.3 s</td><td>21.6 s</td><td>20.7 s</td><td>21.1 s</td></tr></table>	21.3 s	21.6 s	20.7 s	21.1 s				
21.3 s	21.6 s	20.7 s	21.1 s										
Diagonal Pattern Write	60 s		3V/5V Vdd=3.3 V Vpp=5.0 V	<table border="1"><tr><td>35.7 s</td><td>35.5 s</td><td>35.7 s</td><td>31.9 s</td></tr></table>	35.7 s	35.5 s	35.7 s	31.9 s					
35.7 s	35.5 s	35.7 s	31.9 s										
Diagonal Pattern Clear	60 s		3V/12V Vdd=3.3 V Vpp=12.0 V	<table border="1"><tr><td>12.8 s</td><td>13.1 s</td><td>13.2 s</td><td>13.7 s</td></tr></table>	12.8 s	13.1 s	13.2 s	13.7 s					
12.8 s	13.1 s	13.2 s	13.7 s										
Diagonal Pattern Write	60 s		3V/12V Vdd=3.3 V Vpp=12.0V	<table border="1"><tr><td>16.3 s</td><td>16.3 s</td><td>16.3</td><td>16.3s</td></tr></table>	16.3 s	16.3 s	16.3	16.3s					
16.3 s	16.3 s	16.3	16.3s										
Inverse Diagonal Pattern Clear	60 s		5V/5V Vdd=5.0 V Vpp=5.0 V	<table border="1"><tr><td>21.6 s</td><td>21.9 s</td><td>21.0 s</td><td>21.5 s</td></tr></table>	21.6 s	21.9 s	21.0 s	21.5 s					
21.6 s	21.9 s	21.0 s	21.5 s										
Inverse Diagonal Pattern Write	60 s		5V/5V Vdd=5.0 V Vpp=5.0 V	<table border="1"><tr><td>25.9 s</td><td>25.9 s</td><td>25.9 s</td><td>25.9 s</td></tr></table>	25.9 s	25.9 s	25.9 s	25.9 s					
25.9 s	25.9 s	25.9 s	25.9 s										
Inverse Diagonal Pattern Clear	60 s		5V/12V Vdd=5.0 V Vpp=12.0 V	<table border="1"><tr><td>8.7 s</td><td>8.7 s</td><td>8.7 s</td><td>8.7 s</td></tr></table>	8.7 s	8.7 s	8.7 s	8.7 s					
8.7 s	8.7 s	8.7 s	8.7 s										
Inverse Diagonal Pattern Write	60 s		5V/12V Vdd=5.0 V Vpp=12.0 V	<table border="1"><tr><td>25.9 s</td><td>25.9 s</td><td>25.9 s</td><td>25.9 s</td></tr></table>	25.9 s	25.9 s	25.9 s	25.9 s					
25.9 s	25.9 s	25.9 s	25.9 s										

&lt;End of Test Program&gt;

**SN8062 BI Results**

Vpp Erase Current (IPPE)	20 mA	Vpp	Vdd=5.0 V Vpp=5.0 V	13.6 ma	Test Problem	13.3	15.6 ma
Checkerboard Write Vpp Write Current (IPPW)	60 s 22 mA	Vpp	5V/5V Vdd=5.0 V Vpp=5.0 V	25.9 s 14.3 ma	Test Problem Test Problem	25.9 14	25.9 s 16.2 ma
Checkerboard Clear Vpp Erase Current (IPPE)	60 s 10 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s 60 ua	Test Problem Test Problem	8.7 60	8.7 s 60.0 ua
Checkerboard Write Vpp Write Current (IPPW)	60 s 12 mA	Vpp	5V/12V Vdd=5.0 V Vpp=12.0 V	25.9 s 2.0 ma	Test Problem Test Problem	25.9 2	25.9 s 2.0 ma
2000	Checkerboard Clear	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	21.8 s	Test Problem	20.7	21.1 s
	Diagonal Pattern Write	60 s	3V/5V Vdd=3.3 V Vpp=5.0 V	35.7 s	Test Problem	35.7	31.8 s
	Diagonal Pattern Clear	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	14.0 s	Test Problem	13.1	14.1 s
	Diagonal Pattern Write	60 s	3V/12V Vdd=3.3 V Vpp=12.0 V	16.3 s	Test Problem	16.3	16.3 s
	Inverse Diagonal Pattern Clear	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	22.0 s	Test Problem	21	21.3 s
	Inverse Diagonal Pattern Write	60 s	5V/5V Vdd=5.0 V Vpp=5.0 V	25.9 s	Test Problem	25.9	25.9 s
	Inverse Diagonal Pattern Clear	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	8.7 s	Test Problem	8.7	8.7 s
	Inverse Diagonal Pattern Write	60 s	5V/12V Vdd=5.0 V Vpp=12.0 V	25.9 s	Test Problem	25.9	25.9 s

<End of Test Program>